

REMARKS

The Office Action dated December 28, 2009 has been received and carefully noted. The Applicants hereby thank the Examiner for the courtesies extended by the Examiner to the Applicants' representative during the Examiner Interview conducted on April 20, 2010. The above amendments and following remarks are being submitted as a full and complete response thereto.

Claims 1, 4-6, 15 and 16 are pending. By this Amendment, Claim 1 is amended. Support for the amendments to the claims may be found at least on page 12, line 13, to page 13, line 20, of the application as originally filed. Applicants respectfully submit that no new subject matter is presented herein. Reconsideration of this application is respectfully requested in view of the following remarks.

Allowability of Claim 1 Withdrawn

Applicants note the Office Action has withdrawn the indicated allowability of Claim 1 in view of the previously cited U.S. patent 6,142,033 to Beigang in combination with Jacques, FR-2,562,969.

Claim Rejection Under 35 U.S.C. § 112

Claims 1, 4-6, 15 and 16 are rejected under 35 U.S.C. § 112, second paragraph. The Office Action alleges that Claim 1 lacks structural features, namely shaft teeth and hub teeth, that are essential for proper engagement of the shaft tooth section and the hub tooth section as recited in Claim 1. Applicants have amended Claim 1 in a manner suggested by the Examiner in a proposed Examiner's Amendment communicated to the Applicant's representative on December 17, 2009. In particular, the Applicants have amended Claim 1 to recite that the shaft tooth section and the hub tooth section

respectively comprise a plurality of shaft teeth and hub teeth. Accordingly, the Applicants believe the amendments to be responsive to the rejection and request withdrawal of the rejection.

Claim Rejection Under 35 U.S.C. § 103

Claims 1, 4-6, and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over Beigang in view of Jacques, and Claim 16 is rejected under 35 U.S.C. §103(a) as being unpatentable over Beigang, in view of Jacques, as applied to Claims 1, 4-6 and 15, and further in view of Dana, GB-855,282. Applicants respectfully traverse the rejections for at least the following reason(s).

Claim 1 recites a mechanism for transmitting torque between a shaft and a hub that includes, among other features, a hub axially secured to a shaft in a position disposed around the shaft, a shaft tooth section having shaft teeth formed on the shaft and a hub tooth section having hub teeth formed on the hub, wherein a first starting point of a first step region and a second starting point of a second step region are offset from each other in the axial direction of the shaft by a predetermined distance, and wherein the end of the second portion and the end of the second peak portion are offset from each other in the axial direction of the shaft by a predetermined distance.

Beigang discloses a shaft/hub unit having a shaft 1 with shaft toothing 5 and a hub 2 with hub toothing 7, which sets of toothing engage one another. As noted during the interview, the tooth profile in Fig. 1 clearly illustrates that Beigang does not teach or suggest that the predetermined axial offsets between the first starting point of the first step region and the second starting point of the second step region and between the end of the second portion and the end of the second peak portion, as recited by Claim

1.

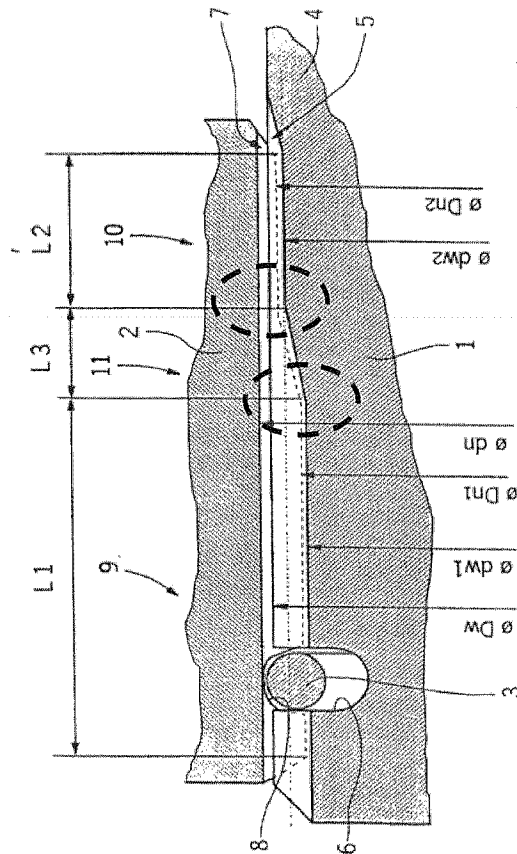


Fig. 1

As highlighted above in Fig. 1 of Beigang, the first starting point of the first step region of the shaft tooth section and the second starting point of the second step region of the hub tooth section are aligned along the axial direction of the shaft 1, as are the end of the second portion and the end of the second peak portion. Beigang does not disclose, teach or suggest the predetermined axial offset features of the hub and shaft tooth sections recited in Claim 1. When the starting points of the step regions (slopes), for example, are aligned with each other as disclosed in Beigang, a stress concentrates

in the shaft. In contrast, in the present invention, the starting points are offset and the stresses are distributed for increased static mechanical strength and fatigue strength. See the comparison data presented in Fig. 9 and the associated discussion describing the effects found on page 21, line 13, to page 22, line 6, of the Substitute Specification.

The Office Action on page 4 admits that Beigang fails to disclose “the first starting point of the first step region and the second starting point of the second step region being offset from each other in the axial direction of the shaft by a predetermined distance.” However, beginning with the last paragraph on page 4, the Office Action asserts that “given that the teeth on the shaft and the hub are free to move relative to each other, the first step region and the second step region could be offset from each other in the axial direction since a gap A3 is present between the two step regions and another gap A4 allows a ring 3 to move freely with the hub, the shaft, or vice versa. These gaps A3, A4 allows the hub to shift and thus making the step regions offset from each other. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to have the first step region be offset relative to the second step region in the axial direction due to these gaps being present.” The Applicants respectfully submit that the reasoning and interpretations applied by the Office Action as described above are not supported, explicitly or implicitly, with respect to the disclosure of Beigang.

Rather, Beigang explicitly teaches away from the Examiner’s interpretations. As shown in Figure 1, the shaft/hub unit of Beigang teaches three portions, a first portion 9, a second portion 10, and a portion of transition 11. In the first portion 9, the shaft toothing 5 has a base diameter d_{w1} and the hub toothing 7 has a major diameter D_{n1} .

In the second portion 10, the shaft toothing 5 has a base diameter $dw2$ and the hub toothing 7 has a major diameter $Dn1$. Beigang teaches that the portions 9 and 10 have a specific longitudinal length $L1$ and $L2$, respectively, and that “[b]etween such portions 9, 10, there is positioned the portion of transition 11 having the length $L3$, in which portion 11 the base diameter of the shaft toothing 5 and the major diameter of the hub toothing 7, in the longitudinal direction, increase constantly from the first portion 9 to the second portion 10, with the base diameter, in the longitudinal direction, extending from the value $dw1$ to the value $dw2$ and with the major diameter of the hub toothing extending from the value $Dn1$ to the value $Dn2$.” See Col. 3, lines 29-62. In other words, because the longitudinal length for portions 9 and 10 are the same $L1$ and $L2$, respectively, for both the shaft toothing 5 and the hub toothing 7, as disclosed and shown clearly in Figure 1, Beigang teaches exact alignment of the various transition points and does not teach an offset. In fact, and absolutely contrary to the unsupported allegation of “another gap A4 [that] allows a ring 3 to move freely with the hub, the shaft, or vice versa,” Beigang specifically discloses that “[i]n the first portion 9, there are provided annular grooves 6, 8 which are engaged by the round retaining ring 3 for axially securing the hub 2 relative to the shaft 1.” See Col. 3, lines 62-64, and Claims 4 and 6-10. Nowhere in the disclosure does Beigang teach or suggest a gap A4 or that the “teeth on the shaft and the hub are free to move relative to each other,” as asserted by the Office Action.

Moreover, Applicants respectively submit that “[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.” See MPEP §2143.03. Accordingly, Applicants note that Claim 1 recites that the first starting point

of the first step region and the second starting point of the second step region are offset from each other in the axial direction of the shaft by a predetermined distance. Assuming, for arguments sake only, that Beigang did teach a gap A4 (not admitted) that allowed axial slip of the shaft toothing relative to the hub toothing, contrary to the stated intent of Beigang, any resulting offset would be completely random and capricious, and certainly not predetermined.

Furthermore, and with regard to the Examiner's comments in the interview summary dated April 23, 2010, the Applicants have amended Claim 1 to recite that the hub is axially secured to the shaft in the position wherein the offsets are defined. As is well known in the art, retaining rings, for example, may be used to secure the hub to the shaft, ensuring a proper meshing of the hub and shaft teeth while preventing the hub from being released from the shaft (see page 12, line 27, to page 13, line 3, of the application as originally filed). Accordingly, the Applicants respectfully submit that the offsets of Claim 1 are not random and capricious, but predetermined and predictable based on the position in which the hub is axially secured to the shaft.

Jacques and Dana are cited for teaching various other features of the present invention and Applicants respectfully submit that Jacques and Dana, alone or by any combination thereof, fail to cure the deficiencies in Beigang with respect to Claim 1. Applicants respectfully submit that Jacques and Dana, alone or by any combination, do not teach or suggest a mechanism for transmitting torque between a shaft and a hub that includes, among other features, a shaft tooth section having shaft teeth formed on the shaft and a hub tooth section having hub teeth formed on the hub, wherein a first starting point of a first step region and a second starting point of a second step region

are offset from each other in the axial direction of the shaft by a predetermined distance, and wherein the end of the second portion and the end of the second peak portion are offset from each other in the axial direction of the shaft by a predetermined distance.

Thus, Beigang, Jacques, and Dana, alone or in any combination, do not teach or suggest the features of Claim 1. As such, the Applicants respectfully submit that one of ordinary skill in the art would not be motivated to modify Beigang, Jacques, and Dana, individually or in any combination, since any modification would not arrive at the invention recited by Claim 1.

Applicants respectfully submit that the specific factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, (1966) have not been considered or properly applied in the Office Action. When rejecting claims under 35 U.S.C. §103, an Examiner bears an initial burden of presenting a *prima facie* case of obviousness. The Applicants respectfully submit that the Office Action has not made a proper *prima facie* rejection under 35 U.S.C. §103(a), because the prior art references fail to teach or suggest the present invention as recited in Claim 1. Moreover, the prior art reference of Beigang does not teach or suggest, but specifically teaches away from, the Office Action's interpretations to justify the obviousness rejections.

For at least the reason(s) stated above, the Applicants respectfully submit that Beigang, Jacques, and Dana do not render Claim 1 obvious. Accordingly, Claim 1 should be deemed allowable over Beigang, Jacques, and Dana and should also be deemed allowable over any combination of Beigang, Jacques, and Dana.

Claims 4-6, 15 and 16 depend from Claim 1. It is respectfully submitted that these dependent claims be deemed allowable for at least the same reason Claim 1 is allowable, as well as for the additional subject matter recited therein.

Withdrawal of the rejections is respectfully requested.

Conclusion

In view of the above, reconsideration of the application, withdrawal of the outstanding rejections, allowance of Claims 1, 4-6, 15 and 16, and the prompt issuance of a Notice of Allowance is respectfully requested.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Docket Number 025416.00026.**

Respectfully submitted,



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